



Advisory Committee on
Northern Development

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Guide for Expeditions to the Canadian Arctic Islands



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Guide for Expeditions to the Canadian Arctic Islands



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Cette publication peut aussi être obtenue en français.

Foreword

I am pleased to issue this brochure for the guidance and assistance of persons planning to travel in the Canadian Arctic.

Developed in co-operation with various federal departments and agencies as well as the Government of the Northwest Territories through the medium of the Advisory Committee on Northern Development, the brochure indicates federal interests relating to the protection of the northern environment and wildlife, and offers information and suggestions designed to make your visit to Canada's unique northern frontier as safe and trouble free as possible.

John C. Munro
Minister of
Indian Affairs and
Northern Development



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Introduction

Within the last decade the increased accessibility of the Canadian Arctic has made the region of interest to more and more people. This brochure is intended to assist you in planning expeditions to the islands and seas north of the Canadian mainland. It will give you some information on what you may expect in the region and will acquaint you with relevant legislation.

This brochure should be used in conjunction with Petro-Canada's *Getting Along in the Arctic Islands*, enclosed in the pocket of the inside back cover.

General Contacts

A number of offices are prepared to assist you in planning your trip.

A focal point within Canada's federal government has been established to co-ordinate all activities related to your expedition:

Director
Public Communications and Parliamentary Relations

Mailing Address:

Indian and Northern Affairs Canada
Ottawa, Ontario
Canada K1A 0H4

Location:

Les Terrasses de la Chaudière
North Tower, 8th Floor
10 Wellington Street
Hull, Quebec

As a point of contact within the Northwest Territories you may use:

Science Adviser
Government of the Northwest Territories
Yellowknife, N.W.T.
Canada X1A 2L9

Personnel of the Polar Continental Shelf Project have been operating in Canada's High Arctic for many years and thus have acquired a wide range of expertise. For advice, contact:

Director, Polar Continental Shelf Project
Energy, Mines and Resources Canada
880 Wellington Street
Ottawa, Ontario
Canada K1A 0E4

The government of the Northwest Territories publishes annually a booklet concerning many aspects of travel in the North. Copies of the *Explorers Guide*, and of other publications of interest to visitors, are available at no cost from:

Travel Arctic
Department of Economic Development and Tourism
Government of the Northwest Territories
Yellowknife, N.W.T.
Canada X1A 2L9

Fish and Wildlife Requirements

Northwest Territories Wildlife Ordinance

This ordinance governs activities related to all wildlife in the Northwest Territories. You are not permitted to hunt big game and will require licences to hunt small game or to ship game or furs out of the Northwest Territories. Small game hunting licences are available in most communities. For more specific information contact:

Superintendent
N.W.T. Wildlife Service
Government of the Northwest Territories
Yellowknife, N.W.T.
Canada X1A 2L9

Migratory Birds Convention Act and Regulations

A number of migratory bird sanctuaries have been established in the Arctic Islands. Activities in these sanctuaries are strictly regulated and a permit is required to enter. Also, a permit is required in any location in the Northwest Territories to take migratory birds or their eggs for research purposes. Further information is available from:

Canadian Wildlife Service
Environment Canada
Ottawa, Ontario
Canada K1A 0E7

Fisheries Act and Regulations

This legislation governs all activities related to fish and marine mammals in Canadian waters, including commercial and sport fishing. Sport-fishing permits and information on catch limits are

available through many outlets in the Northwest Territories. Permits are required for conducting research on or taking specimens of fish and marine mammals. For more specific information contact:

Director General
Western and Northern Region
Freshwater Institute
Fisheries and Oceans Canada
501 University Crescent
Winnipeg, Manitoba
Canada R3T 2N6

Game Export Act

A permit is needed to transport game across any territorial or provincial boundary. In this context "game" includes whole animals or any part, edible or inedible, but excludes finished or processed goods, such as carvings, clothing, or jewellery. You can obtain a permit from some Royal Canadian Mounted Police (RCMP) detachments or any Northwest Territories wildlife officer.

Firearms

Expeditions may, if they wish, carry rifles to protect themselves or their equipment from wild animals, particularly polar bear. However, a rifle should be sealed unless the person responsible for it holds a valid hunting licence. Within a wildlife sanctuary rifles must be sealed whether or not you have a hunting licence. Rifles are usually sealed with lightweight string. The seal, which is easily removed in an emergency, will be applied on request by a wildlife or an RCMP officer.

Under no circumstances are small arms, such as pistols or revolvers, allowed.

Environmental Requirements

National Parks Act and Regulations

The only national park in the Arctic Islands region is Auyuittuq National Park on Baffin Island. For information and special requirements concerning entry into this park, please contact:

Superintendent
Auyuittuq National Park
Pangnirtung, N.W.T.
Canada X0A 0R0

Territorial Land Use Regulations

These regulations are designed to ensure that the sensitive arctic environment is kept clean and that ecological damage does not occur. A permit is required if your expedition will remain in any one location for more than 100 man-days (e.g. five people for 20 days = 100 man-days). Information and permits may be obtained from:

Manager, Land Resources
Indian and Northern Affairs Canada
Yellowknife, N.W.T.
Canada X1A 2R3

Arctic Waters Pollution Prevention Act

This legislation prohibits the deposit of waste that would adversely affect arctic waters in any area north of the 60th parallel. Further information may be obtained from:

Director General
Northern Environment
Indian and Northern Affairs Canada
Ottawa, Ontario
Canada K1A 0H4

Archaeological and Historical Resources Requirements

Canada's North has a long and colourful past and activities are underway to preserve and catalogue it. Archaeological and historical resources, such as sites and artifacts, are protected under the Northwest Territories Archaeological Sites Regulations and the Historical Sites Ordinance. If you come upon or visit any archaeological or historic site, do not disturb or deface it in any manner nor remove or disturb any artifacts. If you find an artifact in any other area of the Arctic, do not touch or remove it unless it is in danger of being destroyed. Instead, note its location on a topographic map and, if possible, photograph it. Such finds should be reported to:

Secretary
Prince of Wales Northern Heritage Centre
Government of the Northwest Territories
Yellowknife, N.W.T.
Canada X1A 2L9

Requirements for archaeological research are outlined in the next section.

Research Requirements

Scientific

All scientific research (excluding that solely related to archaeology or wildlife) to be carried out in the Northwest Territories must be licensed under the Scientists Ordinance. One of the main purposes of this licensing program is to keep interested agencies and in particular nearby communities aware of scientific research of concern to them.

If you are planning to conduct a research project that would involve the people of a community or that would have an effect upon the people's life-style or environment, you should obtain prior approval from the community council to ensure that the project is acceptable and that co-operation from the people will be forthcoming. You are requested to keep the community aware of the progress of the research and to report the results within a reasonable time after completion. Confidentiality of personal data must be respected. You have a moral obligation to terminate any study should it appear harmful to the people or the environment. For further information contact:

Science Adviser
Government of the Northwest Territories
Yellowknife, N.W.T.
Canada X1A 2L9

Archaeological

The Northwest Territories Archaeological Sites Regulations and the Historical Sites Ordinance govern activities related to archaeological investigations and research in the Northwest Territories. Permits for such investigations are issued only to qualified archaeologists. The

Cultural Property Export and Import Act regulates export of articles of particular cultural and historical significance. These may be artifacts, old works of art, or rare fossil specimens. Enquiries and permit applications should be addressed to:

Director
Prince of Wales Northern Heritage Centre
Government of the Northwest Territories
Yellowknife, N.W.T.
Canada X1A 2L9

Wildlife

If you wish to conduct research related to wildlife, you must obtain a licence, as required under the Northwest Territories Wildlife Ordinance. For more specific information please contact:

Superintendent
N.W.T. Wildlife Service
Government of the Northwest Territories
Yellowknife, N.W.T.
Canada X1A 2L9

Under federal regulations, permits are also required for research on migratory birds, fish, and marine mammals. See "Fish and Wildlife Requirements" for more details.

Communications and Transportation Requirements

General Radio Regulations

If you are a licensed amateur in your own country you may operate a radio station in Canada if the same privileges are granted to Canadian amateur radio operators in your country. Written permission is required from the Department of Communications. If you are not a Canadian citizen or a landed immigrant, but possess a valid pilot's licence or permit under the Aeronautics Act, you may, under certain conditions, operate a radio station on board an aircraft registered in Canada. For further information please contact:

Director, Operations Branch
Telecommunications Regulatory Service
Department of Communications
300 Slater Street
Ottawa, Ontario
Canada K1A 0C8

In addition to approval from the Department of Communications, anyone wishing to use a frequency assigned to another agency must have the approval of that agency.

Transportation

Marine

No detailed description of applicable marine acts and regulations for navigating in Canadian waters will be included here. For specific information, contact:

Administrator
Marine Administration
Transport Canada
Ottawa, Ontario
Canada K1A 0N7

Air

Air Navigation Order, Series V, No. 12, and the *Flight Information Manual* give mandatory and suggested emergency equipment and radio equipment to be carried on flights within specific areas of the Arctic.

For current information on airport facilities and operational procedures please refer to the *Northern Supplement* (GPH 205N) available at a cost of \$2.00 a single copy from:

Canada Map Office
Energy, Mines and Resources Canada
615 Booth Street
Ottawa, Ontario
Canada K1A 0E4

Further information on these facilities and pertinent laws and regulations may be obtained from either:

Director General, Public Affairs
Transport Canada
Ottawa, Ontario
Canada K1A 0N5

or

Chief, Airports Division
Department of Local Government
Government of the Northwest Territories
Yellowknife, N.W.T.
Canada X1A 2L9

Customs and Immigration Requirements

Immigration

All foreign nationals must hold a valid passport (except United States citizens and permanent residents, e.g. landed immigrants, of that country). Whether or not you need a visa can be determined by visiting any Canadian diplomatic mission.

Customs and Excise

You should contact Canada Customs well in advance of a planned expedition to Canada's North. A complete listing of the items to be imported along with the value, description and serial number, if any, of each item is required. A brief statement should be given of the purpose of the trip, the methods of transportation, and intended itinerary, including the place and date of entry into Canada and departure from Canada. Once this information has been received you will be advised as to any other requirements and if any duties are to be paid. For further information please contact:

International Traffic Section
Field Liaison Division, Customs and Excise
Revenue Canada
Ottawa, Ontario
Canada K1A 0L5

Requirements for Using Restricted Facilities

Distant Early Warning Sites and Department of National Defence Bases

Distant Early Warning (DEW) radar sites are military units operated by a civilian contractor. Do not include the use of such units in your plans until positive confirmation of support and permission to land at the airstrips has been granted by the Department of National Defence (DND). Such permission is not required to use the airstrips at Tuktoyaktuk, Cambridge Bay, or Hall Beach, but the provision of food or accommodation by the adjacent DEW sites still requires prior approval. If you are considering the use of other bases or stations operated by the Department of National Defence, ensure that permission is sought and confirmed before finalizing travel plans. Contact the following well in advance:

For DEW sites:

Director, Air Operations and Training
Department of National Defence
101 Colonel By Drive
Ottawa, Ontario
Canada K1A 0K2

For DND bases and stations:

Director, Continental Plans Coordination
Department of National Defence
101 Colonel By Drive
Ottawa, Ontario
Canada K1A 0K2

and

Commander, Northern Region Headquarters
Department of National Defence
P.O. Box 6666
Yellowknife, N.W.T.
Canada X1A 2R3

Please note: You are advised that these locations cannot be expected to serve as a source of supplies, fuel, or accommodation.

High Arctic Weather Stations

The Atmospheric Environment Service of Environment Canada operates weather stations at two points remote from communities. These are at Eureka on Ellesmere Island and Mould Bay on Prince Patrick Island. Authorization to visit these stations must be obtained by writing at least four weeks in advance to:

Regional Administrator
Transport Canada
405-391 York Avenue
Winnipeg, Manitoba
Canada R3C 0P6

and

Arctic Coordinator
Atmospheric Environment Service
Environment Canada
4905 Dufferin Street
Downsview, Ontario
Canada M3H 5T4

General Guidelines

Food

Any expedition must be entirely self-sufficient or at least make plans for provisions in advance. It is unlawful to hunt big game, such as caribou or muskoxen, for food. Failure to plan your food requirements adequately is not considered justification under the Northwest Territories Wildlife Ordinance to hunt big game for food.

Marine Assistance

Ships operating north of the 60th parallel are strongly recommended to report their position and ice information daily to the Canadian Coast Guard at Inuvik, Cambridge Bay, or Frobisher Bay, whichever location is most appropriate. Radio frequencies to be used are listed in the Transport Canada document *Radio Aids to Marine Navigation*, which must be carried by every ship engaged in the coasting trade of Canada. Should further information relating to radio frequencies be required please contact:

Chief, Field Services Division
Telecommunications and Electronics Branch
Canadian Coast Guard Service
Transport Canada
Ottawa, Ontario
Canada K1A 0N7

Wilderness Travel Registration System

A voluntary wilderness travel system is operated by the RCMP in co-operation with the government of the Northwest Territories. This

is a free service and has proven invaluable in searching for lost parties. Registration forms are available from any RCMP detachment or from:

Travel Arctic
Department of Economic Development and Tourism
Government of the Northwest Territories
Yellowknife, N.W.T.
Canada X1A 2L9

A sample of the registration form is to be found at the end of this brochure.

Small Communities

The unexpected arrival of a group in a small community lacking any accommodation for visitors may be very disruptive to that community's life-style. It is strongly recommended that advance warning of your arrival be given to the local settlement secretary. Should you require any special arrangements, e.g. accommodation, special supplies, or hiring of local personnel, several weeks notice should be given.

General Information

Insects

An expedition can be arduous enough without the added discomfort caused by biting insects. This nuisance varies with the season and location, but definitely should be taken into consideration. For information about biting insects in that part of the Arctic to which you intend to travel, contact:

Information Services
Agriculture Canada
Ottawa, Ontario
Canada K1A 0C7

Radio Assistance

From March 1 to September 20, the Polar Continental Shelf Project operates and monitors a high frequency radio network in the High Arctic. If your expedition would like to avail itself of this service please contact:

Director, Polar Continental Shelf Project
Energy, Mines and Resources Canada
880 Wellington Street
Ottawa, Ontario
Canada K1A 0E4

Geographical Names

Expeditions may travel over areas in which unnamed geographical features are situated. Proposed names for such features are considered for approval by the Canadian Permanent Committee on Geographical Names, subject to established toponymic guidelines. To

assist you, copies of *Principles and Procedures of Geographical Naming* are available on request from:

Toponymic Research Unit
Advisory Committee on Northern Development Secretariat
Indian and Northern Affairs Canada
Ottawa, Ontario
Canada K1A 0H4

Medical Services

Information on the location and type of medical services available throughout the North and how to use them may be obtained from:

Regional Director
Medical Services
Northwest Territories Region
Health and Welfare Canada
Bag 7777
Yellowknife, N.W.T.
Canada X1A 2R3

Topography

The Arctic Islands, lying north of Canada's mainland, are the largest island group in the world, having a land area greater than 1 300 000 km² and exhibiting a wide variety of terrain, ranging through marine plains, windswept desert-like barrens, wet meadows, and rugged uplands. For more information, you are referred to detailed topographic maps of the region, scale of 1:250 000, which are available from:

Canada Map Office
Energy, Mines and Resources Canada
615 Booth Street
Ottawa, Ontario
Canada K1A 0E4

Climate

Information on climate can be obtained from:

Arctic Meteorology Section
Applications and Impact Division
Canadian Climate Centre
Environment Canada
4905 Dufferin Street
Downsview, Ontario
Canada M3H 5T4

Sea Ice

Information on sea ice is available from:

Director, Ice Branch
Central Services Directorate
Atmospheric Environment Service
Environment Canada
4905 Dufferin Street
Downsview, Ontario
Canada M3H 5T4

Royal Canadian Mounted Police

Location of RCMP Detachments

The following detachments are in a position to offer assistance and act as contact points: Inuvik, Tuktoyaktuk, Sachs Harbour, Coppermine, Spence Bay, Igloolik, Frobisher Bay, Pangnirtung, Clyde River, Pond Inlet, Nanisivik, Grise Fiord, and Resolute Bay.

Communications

Each detachment is equipped with single side-band radio and/or telephone giving it access to major centres such as Frobisher Bay, Inuvik, and Yellowknife. Expeditions should be aware that the RCMP is not in a position to offer a radio-monitoring service, but such a

service may be available from the Polar Continental Shelf Project as mentioned previously in "Radio Assistance."

Search and Rescue

RCMP detachments at Yellowknife, Inuvik, and Frobisher Bay are equipped with Twin Otter aircraft. These are used to supplement initial ground searches organized before involving the Department of National Defence, which has primary responsibility for air search and rescue. Further information as required is available by writing to:

Commanding Officer "G" Division
Royal Canadian Mounted Police
Bag 5000
Yellowknife, N.W.T.
Canada X0E 1H0

Royal Canadian Mounted Police
Northwest Territories Wilderness Travel Registration

Occurrence No. _____

(For RCMP Use)

1. **Registered at** _____ **Date** _____

2. **Departure from** _____ **Date** _____

3. **Members in party** (Please print full names and addresses)

4. **Next of Kin** (Please print full name, address and phone number)

Next of kin will be notified if you fail to report to RCMP at your destination point.

5. **Points of Call on Route** _____ **Estimated date of call** _____

6. **Destination Point** _____ **Estimated time of arrival** _____

7. **Estimated Date of Return to Home Residence** _____

8. **Mode of Travel** _____ **Equipment** _____ **Make** _____ **Colour** _____

9. **Provisions on Hand for** _____ **Days.**

Success of this program depends on your reporting completion of journey to RCMP.

Signatures

Member of party _____ RCMP _____

Journey completed _____

Getting Along in the Arctic Islands



Introduction

Most Canadians live in a thin strip of land along the southern border of Canada. For the majority, this population belt represents comfortable and familiar territory.

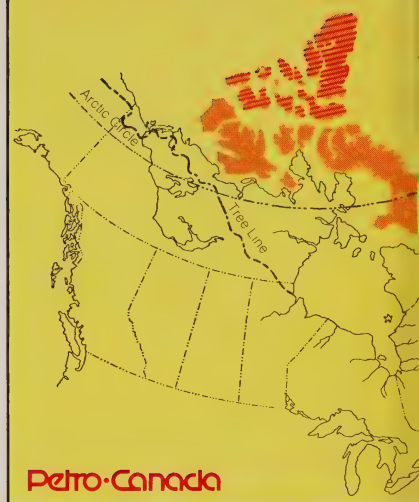
Some of the most fascinating Canadian countryside, however, lies in the relatively uninhabited areas 'up North.' Northern regions are foreign to most of us, the strangeness of the life and land increasing with distance.

The high Arctic, being most distant, is consequently perceived as most alien. Increasingly, however, development of the North is rendering this land of long days and nights, enduring cold, and austere beauty accessible to greater numbers of people.

The 'barrens' is a term often used to describe the lands of the Arctic. Much of the high Arctic *is* barren of all forms of life, but the term is still, in many respects, a misnomer. To those who have seen the myriads of flowers blooming in the brief summer, the Arctic is certainly not barren. One gets the same impression when observing a herd of whales swimming in a sheltered fiord or watching a score of muskoxen grazing on a wind-swept meadow.

This booklet is designed to create an awareness and understanding of the environment in the Arctic Islands. It contains information on climate, people, land, plants, land mammals, birds, seas and sea ice, marine mammals, fish, and ways of handling the cold. Although it applies generally to the Canadian Arctic Archipelago, it focuses on the upper tier of the Archipelago known as the Queen Elizabeth Islands, because it is here that much of Petro-Canada's activities for the proposed Arctic Pilot Project would be concentrated.

We who visit the North must remember that while we are there, minimal disturbance of the land and its people should be our motto. In this spirit, the concerns of all parties interested in northern development can best be accommodated.



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Climate

The main features of the climate of the Arctic Islands are low temperatures, short cool summers, long cold winters, and low precipitation.

Average annual temperatures are lower than in any other part of Canada, ranging from -6°C at Baffin Island in the extreme southeast to -20°C in northern Ellesmere Island. But record low temperatures of -45°C to -50°C at most stations in the Arctic Archipelago are not as low as the North American record of -63°C reported at Snag in the Yukon, or even the -55°C to -60°C temperatures that have been reported at a few northern locations in the western provinces and Ontario. Obviously, the Arctic Archipelago does not earn its reputation as the coldest region in Canada from extremes of low temperature but rather from the persistent cold it experiences.

During the cool summer, the largely ice-covered seas with surface temperatures near -1°C prevent the air from warming appreciably. Consequently, summer temperatures are cool throughout the entire region, averaging 1°C to 8°C during July, the warmest month. Summers are generally unpleasant, with a high percentage of low cloud and drizzly weather.

In winter, most water surfaces are frozen, but conduction of heat from the water below the ice exerts a moderating influence. February is normally the coldest month, with average temperatures generally ranging from -33°C to -38°C in the Queen Elizabeth Islands.

A record low temperature of -54°C was recorded at Isachsen on Ellef Ringnes Island on March 16, 1956. The record high at Cambridge Bay on southern Victoria Island is 29°C , recorded on July 1, 1930. These are not necessarily the meteorological champions for the Archipelago, but they probably come close.

Winters pass in near darkness. The polar night on Melville Island begins late in Oc-

tober and ends in early February, a little over three months when the sun does not appear. The nights are seldom really dark because of the glitter of stars, often reinforced by moonlight. Nightless days, when the sun never sets, last from early May to mid-August.

The Archipelago receives very little precipitation. The annual total over most of the Queen Elizabeth Islands averages less than 13 centimetres, no greater than on the Sahara. Eureka reports 6 centimetres a year. Although showers and even a rare thunderstorm may occur occasionally in the southern part of the Archipelago, most summer rainfall is in the form of a light drizzle.

Snow may fall in any month of the year, but the ground begins to clear in late June. Some snowbanks persist through the summer, but most of the snow that falls in the summer months does not remain on the ground. New snow begins to accumulate in September. Although snowfall is light, maximum monthly snowfalls occur in autumn and spring.

Because Arctic snow is so fine and powdery, it is readily blown about by the wind with the result that much of the ground is bare throughout the winter, although accumulations up to 6 metres deep may form in ravines, hollows, and in the lee of obstacles. The average depth of late winter snow cover in the Archipelago varies from about 75 centimetres in the extreme southeast to less than 25 centimetres in the northwest.

Winds at most Arctic stations are no stronger than those at cities in southern Canada. Average wind speeds are about 16 kilometres per hour, although hourly wind speeds have exceeded 100 to 110 kilometres per hour at most locations. In mountainous regions, particularly in restricted locations, there may be gale-force winds for about one-third of the year, while in nearby areas there may be only a couple of stormy days a year.

Because of the low temperatures, the chilling effects of winds are considerable. The term "wind-chill" is often used to in-

dedicate the relative severity, or human discomfort, of the combination of wind and low temperature. January on Prince Patrick Island has a mean wind-chill of 2250 watts per square metre, which corresponds to a temperature of -40°C and a wind speed of 15 kilometres per hour (see the wind-chill graph in the sec-

tion on *Man and the Cold*). This is extremely cold as at 1850, unprotected skin can freeze in 1 minute with direct exposure. But severe wind-chill factors are not confined to the Arctic. January in Winnipeg has a mean wind-chill of 1800 despite the fact that Winnipeg lies 3000 kilometres to the south.





Snowhouse, Jones Sound

People

The upper tier of the Archipelago, the Queen Elizabeth Islands, is a massive area virtually devoid of people. There are only two Inuit settlements, Resolute on Cornwallis Island and Grise Fiord on Ellesmere Island.

Resolute is a key transportation and communications centre. The settlement of Resolute Bay has a permanent population of about 160 and the "base," located at the airport, has a largely floating population of around 130 with seasonal increases to two or three hundred. Grise Fiord, with about 100 people, still depends primarily on the traditional Inuit pursuits of hunting, trapping, fishing, and handicrafts. Weather stations are maintained year round at Eureka on Ellesmere Island and Mould Bay on Prince Patrick Island.

Alert, a military base and weather station with a population of 200, is located on the northern tip of Ellesmere Island. It is the most northerly settlement in Canada. Melville, Bathurst, Devon, Axel Heiberg, Amund Ringnes, and other

smaller islands of the Queen Elizabeth group have no permanent settlements.

There are archaeological sites on Axel Heiberg, Bathurst, Coburg, Devon, Ellesmere, and Cornwallis Islands, indicating that early Eskimo peoples lived throughout the region at various times in the past. During the 1800's and early 1900's, when such explorers as Sir William Edward Parry, Sir John Ross, Sir John Franklin, Otto Sverdrup, and Vilhjalmur Stefansson plied the arctic seas, no Inuit lived on the Queen Elizabeth Islands, although groups of Inuit living on more southerly islands travelled to the area in hunting parties or with scientific and exploratory expeditions. In the early 1950's, Inuit families were moved to Resolute and Grise Fiord from northern Quebec and Baffin Island, thus repopulating the area.

Why did so few Inuit inhabit this region? The main reason is a scarcity of food. On Melville Island, walrus are absent and seal and fish populations are low. About 2000 Peary caribou inhabit the island, but the population has declined drama-

tically in recent years and probably could not sustain intensive hunting pressure. Muskoxen are relatively abundant, numbering 2000-3000 but even a brief flurry of hunting would endanger this species locally.

When dealing with people who live by customs different than our own, we run the risk of making a fundamental error in human relations: we take our own customs for granted and judge the ways of others by how close they come to our own.

In order to deal effectively with strangers, it is essential that we appreciate their values and viewpoints. This is not only a courteous course of action; it also minimizes costly or embarrassing errors which result from misunderstanding.

The people who live in Canada's high Arctic are called Eskimos by southerners, though they refer to themselves as the Inuit, which means simply "the people." (The name "Eskimo" is actually derived from the Cree word "Esquimau" meaning "eaters of raw meat.")

Ancestors of the Inuit have inhabited the arctic desert for at least 5,000 years. During this time, they have shown tremendous adaptability and inventiveness to cope with their harsh environment and have evolved a way of life intimately connected to the land which is, to them, vital and precious. Examples of their ingenuity include: snowhouses or igloos, still used by Inuit hunters on the land; stone lamps or "kudliks" used for cooking, light, and heat; stone figures or "inukshuks," built to guide travellers or frighten caribou into ambush; and pronged spears or "kaki-vats," traditionally used for spearing fish.

Since the days of explorers, fur traders, and whalers, the Inuit have had increasing contact with southern Canadian society. Most under age 30 have had some schooling, probably up to grades 6 or 8, and those under middle age usually know some English. They all speak their own language, "Inuktitut," and many can write this language in syllabics.

Fewer Inuit live on the land now. They reside in small settlements that usually have a nursing station, a small store, an RCMP officer, and some government offices. They take an active role in community affairs as settlement chairmen and councillors, as well as in other areas of community involvement such as the running of craft and housing co-operatives. The numbers of full-time hunters and trappers have declined; however, many Inuit still depend on the land to provide food and recreation as well as cash income from furs.

Centuries of living off the land made it necessary for the Inuit to develop and adopt certain customs in order to survive. Although these customs seem unfamiliar to southern Canadians, they were essential and effective for the Inuit way of life.

The Inuit have a distinctive attitude toward space and time. Generations of hunting on a vast, harsh land made time and distance almost irrelevant. The endless search for food was not dictated by clocks. Consequently, work schedules and punctuality, so important to us, are new concepts for the Inuit and strict adherence to them is unfamiliar.

As a hunting people, the Inuit could not plan too far into the future. Having no control over nature, they learned to wait with patience until the weather improved or the caribou herds came by.

Related to Inuit conceptions of time and their closeness to the land are seasonal variations in their temperament. The necessity and pleasures of hunting continue to play an essential part in Inuit lifestyles. This deep attachment is especially evident in the spring when game becomes plentiful. Even when employed, many Inuit continue to feel compelled to leave other commitments and hunt for their meat supply.

Southerners can have difficulty communicating with the Inuit who conscientiously use non-verbal cues and gestures to convey their messages and understand those of others. This makes

them appear more soft-spoken and sensitive than many whites.

The Inuit are not an overtly competitive or aggressive people. This is not to say that they are not energetic or competent. They just do not share our tendency to berate ourselves or others when a challenge is not met.

Generations of living in a difficult environment have instilled a co-operative rather than competitive spirit among the Inuit. In such a world, collective survival depended on getting along. Consequently, harsh words and physical abuse were not tolerated.

It is clear that the Inuit are quite different from us and should be appreciated as such. They deserve the respect that all visitors should show to a different culture. And like all good guests, we should remember that when we are unsure of what is going on, or how to act, the safest course of action is to proceed cautiously.

If we fail to appreciate the land and people of the high Arctic, we can expect to meet difficulty or embarrassment. Mutual feelings of respect are easily lost and difficult to regain.

It is important for newcomers to be sensitive and cautious with the people of the North. Only if we take this attitude can encounters be mutually productive.

*Inuk hunter and seal,
Jones Sound*

R. R. RIEWE



Prehistory

Ancestors of the Inuit have occupied parts of the Arctic Archipelago for several thousand years. The Denbigh people, the first Eskimo culture of the Canadian Arctic, spread rapidly eastward from Alaska 5000 years ago. Denbigh people were living on northern Ellesmere Island about 4500 years ago — long before the days of the Roman Empire. They sewed clothing with needles fashioned from the bones of birds and foxes, hunted with bows and arrows, and lived in oval houses probably roofed with skins.

Possibly owing to a cooling trend in the climate, the Denbigh people moved south, abandoning the northern islands. When warmer conditions returned, about 3000 years ago, a new culture called the “Dorset Culture” or “Toonit” spread rapidly across the Arctic, reoccupying most of the region once inhabited by the Denbigh people.

The Dorset people seem to have adapted well to life among snow and ice. They made snow knives from bones and may have been the first to use the snowhouse or igloo. Their houses were heated by stone lamps fueled with animal fat.

About 1000 to 1500 years ago, another warming trend coincided with the spread of another new culture across the Arctic. Known as the Thule culture, it developed from the original Denbigh culture in Alaska. After centuries during which the Dorset people mingled with or retreated from the Thule people, the Dorset culture disappeared.

The Thule people, ancestors of the Inuit, were better equipped than the Denbigh or Dorset people. They lived in large villages in houses with stone floors and walls made from whale ribs or boulders covered with turf. The cornerstone of their culture was whaling.

From 1650 to 1850, there was a spell of cold climate known as the “Little Ice Age.” During this time, whaling became less successful and the people turned to

caribou and seals as their mainstays. The importance of villages declined and smaller groups lived in seasonal camps in tents and snowhouses. By about 1700, the Thule culture had become that of the modern Eskimos, the Inuit.

The Value of Country Food

Southern food is very expensive in the Arctic due to high transportation and overhead costs. Most people living in settlements cannot afford to depend on it for the bulk of their diet. As a result, the value of locally harvested game and fish is very high. Even if people could afford to buy southern food, they would find it inferior to native fare: the protein content of wild game such as caribou is about 50 percent higher than that of domestic livestock.

Formal Organization

The settlements of Resolute Bay and Grise Fiord have elected councils to manage community affairs.

Administrative support is provided to each council by a settlement secretary who is seconded to the council by the Government of the Northwest Territories. Councils should be consulted well in advance of conducting any activities in and around a community.

Arctic communities frequently have other formal organizations which should be consulted or of which the visitor should be aware. For example, the Hunters and Trappers Association is an advisory group with concerns for environmental, wildlife, and similar matters within the territory used by hunters and trappers of the community.

Most Inuit communities are linked to the Inuit Tapirisat (Eskimo Brotherhood) of Canada via a resident representative. The Inuit Tapirisat, an umbrella organization based in Ottawa, makes frequent representations to government on behalf of Inuit communities. It has been responsible for researching and preparing the Inuit land claims for the high and eastern Arctic.



Land

Bjorne Peninsula, Ellesmere Island

The Canadian Arctic Archipelago, with a land area of over 1,300,000 square kilometres, is the largest island group in the world. It can be divided into two tiers separated by the Parry Channel which runs east and west from Lancaster Sound to M'Clure Strait. The lower tier contains Baffin and Victoria Islands, the fifth and ninth largest islands in the world. The upper tier is the Queen Elizabeth Islands which comprise a land area of about 430,000 square kilometres.

Most of the Queen Elizabeth Islands are polar desert, with rolling plateaus, marine

plains, or rugged undulating uplands featuring occasional steep escarpments and frequent outcrops of limestone, sandstone, and shale. Ellesmere, Devon, and Axel Heiberg Islands are mountainous; in places, summits rise above 2 kilometres, forming a deeply indented and dissected rugged fiord coastline.

Melville Island, the third largest island in the group, is mostly highland in character. The terrain is very rugged, with maximum heights reaching about 1 kilometre. The coasts of the island vary from low,



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flat beaches to sheer 360-metre cliffs. In contrast, the southwest coast of Bathurst Island slopes gently to the sea, with gravelly ridges marking emerged beaches.

The islands have only recently (in geological time) begun emerging from beneath the glaciers that covered them about 10,000 years ago. As the glaciers melted, the land was freed from the crushing weight of ice and began to "spring back" faster than the melting ice caused the sea to rise. Devon Island rose at a geologically rapid rate of a few centi-

metres per year for the first 1000 years. Then the rate of rise steadily decreased and now appears to be matched by the rise in sea level.

Extensive glacier systems still cover parts of the eastern and northern Archipelago and are a feature of the islands. On eastern Devon Island, an ice cap rises to a dome about 1900 metres above sea level, while on northern Ellesmere Island the ice cap is about 2100 metres above sea level, punctuated by mountain peaks which are among the highest in Canada.

Ecological Sites

Ecological sites are unique areas, designated to be of such biological importance that they are worthy of special protection. These areas support a variety of plant and animal communities and may contain relic or endangered populations, unique plant associations, breeding areas and critical ranges for animals, pristine lakes, mineral springs, and marine areas. These sites are intended to allow the opportunity to study natural ecosystems or to observe the recovery of ecosystems from natural and human disturbance.

Twenty-three areas have been proposed for consideration as ecological sites in the Queen Elizabeth Islands. These sites represent a variety of unique plant and animal communities. • Bailey Point on Melville Island has the highest muskox densities in the Canadian Arctic. • Seymour Island northwest of Bathurst Island, has the only breeding colony of the rare ivory gull in the Canadian Arctic and is a proposed federal Migratory Bird Sanctuary. • The Bracebridge-Goodsir Inlets site (Polar Bear Pass) on Bathurst Island provides important habitat for 42 species of birds and 8 species of mammals. • Hobhouse Inlet on Devon Island is the home of 75,000 to 100,000 breeding pairs of northern fulmars — possibly the largest colony known. • The Cape Sparbo site on Devon Island features lowlands with exceptionally luxuriant vegetation, 150-200 muskoxen, and lakes containing arctic char. The Truelove Lowland, part of the site, has been the base for many geological, glaciological, ecological, and archaeological studies. • The Coburg Island site, at the eastern entrance to Jones Sound, features 200,000 breeding pairs of thick-billed murre, walrus haul-out sites, and large concentrations of belugas and narwhals. • Tanquary Fiord on Ellesmere Island has a diverse flora due to its remarkably warm summers. • Fosheim Peninsula on Ellesmere Island, described as one of the richest biological sites in the high Arctic,

supports thousands of arctic hares, often found in large herds. • Phillips Inlet on the top of Ellesmere Island is noted for its glaciers including the ice shelf which is the source of most of the large ice islands found among the Queen Elizabeth Islands.

Permafrost

One of the characteristics of northern areas of Canada is the ground condition known as permafrost. Permafrost is a term used to describe ground that remains below 0°C for at least one year. The definition, which has nothing to do with the type of ground, applies equally well to frozen sands or gravels as to solid rock.

The first recorded observation of this phenomenon in North America was made by Martin Frobisher in the late 1500's. It was during the excavation of ore on southern Baffin Island that frozen ground was encountered.

Permafrost thickness in the Archipelago is believed to range from 300 metres at Cambridge Bay, Victoria Island, to possibly 600 metres on the north coast of Ellesmere Island. Permafrost thickness of 1000 metres or more may exist in the interior of Baffin and Ellesmere Islands, particularly at high elevations. The thickest recorded permafrost in the Archipelago, and indeed in Canada, is at Winter Harbour on Melville Island where temperature measurements indicate the permafrost to be about 560 metres thick.

Above the permafrost is the active layer which freezes in winter and thaws in summer. Generally less than 1 metre thick, it varies in depth depending on climatic and terrain factors.

Keeping the permafrost frozen depends on maintaining the balance between heat entering the ground and heat leaving it.

If the surface is disturbed, especially if insulating vegetation is removed, more heat than usual can enter the ground and alter the balance. Where the underlying permafrost consists of frozen rock, such disturbances create few problems. But where underlying permafrost consists of frozen soils containing ice, the soils lose their ability to support a load and settle as the ice melts away. Many problems can result, ranging from rutting and scarring of the landscape to ponding and landslides.

The ice in frozen soil can take several forms. Often invisible to the naked eye, it acts as a cementing agent between soil particles. Sometimes individual crystals can be seen, while in other cases distinct veins of ice occur. Large ice masses can be found in some areas in irregular

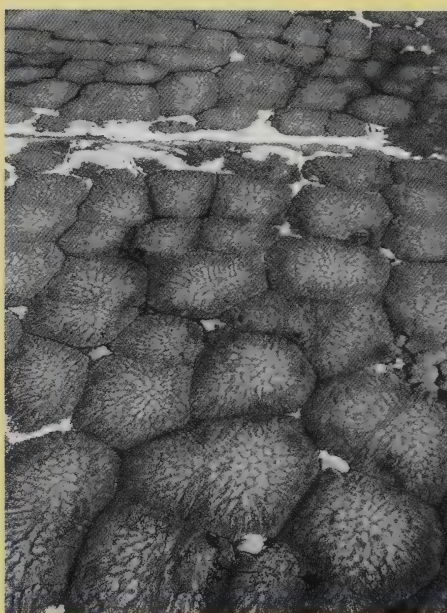
layers, as vertical wedge-shaped veins or as large blocks and sheets.

Soils with high ice content can sometimes be detected by the presence of patterned ground, frost mounds, areas where the ground has settled as a result of previous disturbance, or areas where the wet, thawed, active layer gradually creeps downslope over the frozen sub-soil.

To protect the surface from disturbance, overland travel and construction activities can be restricted to winter when the ground is frozen. When summer construction activity is necessary, disturbance of permafrost can be reduced by placing structures or work sites (drilling rigs, camps, airstrips, wharves, or stock-pile areas) on an insulating gravel pad.



Frost mound, often an indication of the presence of high-ice-content soils in an area.



Aerial photograph of patterned ground. Ice-wedge polygons such as these commonly measure 30 to 50 metres across.

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Litter

Disposal of litter and garbage is an inevitable problem at field camps and larger facilities throughout the Arctic. Too often we have seen pictures of rusting gas barrels, windblown plastic and paper, and abandoned heavy equipment scarring the northern landscape. Litter continues to be an eyesore for many years after the camp itself is gone. This is particularly true in the Arctic where natural decomposition is very slow.

Today, an increased sensitivity toward the problems of litter is backed up by laws and regulations that govern disposal and provide penalties for those who dump wastes, including garbage. Most industrial activities in the North are now conducted under land-use regulations that specify how waste is to be removed.

Such regulations go a long way toward maintaining the land in an aesthetically pleasing state. In general, the regulations state that whatever is taken into camps should be taken out again, except for those items that are permitted to be buried or incinerated. Complete daily incineration of all waste food is essential to discourage polar bears, foxes, and wolves from gathering around camps. Any rubbish that accumulates over winter makes a thorough spring cleanup an essential part of camp maintenance.

Litter, although it might seem a small item, can do much to affect an operation's public image. The Inuit inhabitants of these northern areas have a profound respect for the land. We can exhibit our good faith by showing a similar respect — and good housekeeping is an important step in this direction.

Plant Life

In many respects, the high Arctic is a desert. Vast areas are covered by rock-strewn barren flats which, in summer, appear bare of vegetation from the air. But as in other desert regions, there are relatively lush oases. These oases, generally confined to coastal lowlands and valleys, sustain an almost continuous cover of sedges and mosses as well as some flowering plants. Although they cover only 2 percent of the landmass, these oases provide important habitat to certain wildlife species.

Plants of the high Arctic are characteristically short. Lichens, a component of most plant communities, are usually under 3 centimetres tall. Most species of flowers grow in dense cushions or mats that seldom grow beyond 10 centimetres in height. Sedges and grasses, the "giant" plants of the islands, rarely grow taller than 25 centimetres, even in the best sites.

Only a few woody species commonly grow in the treeless islands, the most common being a low, ground-hugging willow. Less frequent are a type of heather and a blueberry that rarely bears fruit. There are no climbing plants, poisonous plants, plants that sting, or plants protected by thorns or spines.

Nearly all arctic species are perennials. Summer is generally too short for annual species to germinate, bloom, and produce seed in one season in all but the best and most protected sites. And even in these areas, a "crop failure" could eliminate a species locally.

Permafrost affects plant growth by keeping soil temperatures low. This results in little soil development, inhibits the activity of soil micro-organisms which release nutrients needed for growth, and even reduces the ability of plants to take up limited nutrients that may be released.

Entrance to fox den on Devon Island. Vegetation around animal burrows, owl perches, skeletal remains, and other "enriched" local areas is often more colourful than in the surrounding landscape.

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Gale-force winter winds play a major role in limiting the height, growth, and distribution of arctic plants. They drive small, hard, sharp snow crystals against all exposed plant parts, abrading, drying, and finally killing them. Some species only grow in depressions that are quickly filled by the snows of early winter. A single exposure of one of these plants to abrasion will reduce its vigour for several years, possibly killing it. Plants that grow in more exposed areas are low-growing and have evolved wintering buds that are hidden inside the plant mat or cushion where they are protected by old leaves or other plant parts.

Arctic plants have developed numerous adaptations to low summer temperatures. Most adaptations raise the temperature at which plants carry out their metabolic activities. The formation of dense mats, cushions, and rosettes reduces wind movement among leaves and traps air. Many flowering species also have abundant deep red pigments, in addition to the normal green chlorophyll, that give the plant a dark appearance. The combined factors of trapped air and dark colour cause plant parts to be 10°C or more higher than the surrounding air. Some arctic flowers, such as the arctic poppy, are "solar heaters." Their para-



Muskoxen in a lush oasis on Devon Island

bolic shape, colour, dark pigment, and a sun-tracking mechanism all combine to increase the internal temperature of the plant 5 to 10°C. This makes it possible for seeds to ripen by speeding up metabolic activities in the ovary and attracts insects which come to bask in the warmth and pollinate the flower.

Large boulders influence plant growth indirectly by creating favourable conditions around themselves. They concentrate rain in narrow zones around their edges. In addition, many large rocks are used as perches by birds such as snowy owls; the birds often leave droppings and

bits of food nearby. The higher levels of moisture and nutrients around the boulders greatly improve the suitability of these sites for plant growth. Plants have the ability to grow and flourish in the severe conditions of the Queen Elizabeth Islands but they grow very slowly. Disturbed, they may die or take an extremely long time to recover. Very few species can pioneer disturbed sites since seed production, seedling establishment, and growth rates are low. Disturbance of the plant cover by overland travel in summer should be prohibited, particularly in the lush areas which cover such a small part of the landscape.



Cottongrass on southern Melville Island



Arctic fox

*Peary caribou,
Bjorne Peninsula,
Ellesmere Island*

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Land Mammals

The Queen Elizabeth Islands and surrounding seas are home to relatively few species of mammals, at least when compared to the rest of Canada, and populations of most of these are small. Of the approximately 200 species of mammals in Canada, only 17 occur in the islands. Several of these are peripheral to the region, occurring only in the easternmost areas. On the land, the list includes two large grazers (caribou and muskoxen), three carnivores (wolf, arctic fox, and ermine), one rodent (the collared lemming), and the arctic hare.

Peary caribou, smaller and paler than their mainland relatives, the barren-

ground caribou, are found mainly in the Queen Elizabeth Islands. In contrast to the more southerly races, they occur in small, sparsely scattered groups, probably a response to the very limited food supplies on the islands.

Although these caribou lack the spectacular mass migrations typical of the barren-ground caribou, most of them use more than one island and make seasonal movements of up to several hundred kilometres between islands in spring and fall. Eglinton, Prince Patrick, and Melville Islands, and possibly others as well, must thus be considered as one unit as far as the caribou population is concerned.

Local movements also occur on individual islands. After calving in late May or early June, caribou move from the higher, inland plateaus, where they generally winter, to coastal regions, seeking new growth on drier coastal sites. They move to the interior plateaus in mid-summer, but return to the coast to mate in fall.

There are believed to be about 2000–3000 caribou on the western Queen Elizabeth Islands, mostly on Melville, Bathurst, and Prince Patrick. Eastern Melville, the Dundas Peninsula, and south-central Prince Patrick support the most caribou. There are probably a few hundred more on Devon and Ellesmere. These figures represent a drastic decrease in numbers since 1961, when about 25,000 were present. Caribou numbers on Bathurst may have declined to a point where they could easily be eliminated from the island. The decline is believed due to forage being unavailable in several years with early falls, late springs, deep snow, and ice-layering of the ground.

Traditionally, caribou were one of the most important resources supporting Inuit life, providing food and clothing. Much of that role is retained today. Hunters from Resolute obtain caribou on Somerset and Prince of Wales Islands, while Grise Fiord gets its caribou from Devon and southern Ellesmere. Hunting occurs primarily in October–November and March–May.

The muskox, a relic of the last ice age, is apparently most closely related to goats and sheep. About 2700 are found on the western Queen Elizabeths, with about 2400 of these on Melville, and smaller numbers on Bathurst, Prince Patrick, Eglinton, and Little Cornwallis. A few hundred are believed to be present on Devon, and several thousand on Ellesmere. Melville, especially the southwest part of the island (Bailey Point area), is the heartland for muskoxen on the western Queen Elizabeths. Although muskox populations on these islands increased greatly between 1961 and 1973, they had declined sharply by 1974, due

mainly to unfavourable snow and ice conditions.

There are apparently no regular large-scale seasonal movements of muskoxen between islands, but some such movements do occur. Local movements on the islands do occur regularly, however. Muskoxen prefer sedge meadows and willow slopes at low elevations. They move inland in summer, generally along watercourses and drainage slopes.

Muskoxen may be found in small groups or individually in summer, but large groups form in fall at about the time of mating and persist through winter. Such groups, built around the dominant males, have a mutual defense system, the familiar "ring," so effective against wolves but which makes them easy to hunt with rifles. Calves are born into these groups between March and May.

Until the 1960's, Peary caribou and muskoxen on most of the Queen Elizabeth Islands were relatively isolated from human activities, although in certain areas native hunters and white explorers had reduced their numbers. The recent population declines indicate that they may need special protection to guard against further losses or even elimination from certain areas. Although they are currently hunted by Resolute and Grise Fiord Inuit, increased hunting pressure (including the advent of sport hunting) would further endanger them. Range loss or disturbance due to human activity, particularly in winter and during or after calving, as well as obstacles preventing free movement would decrease chances for population growth.

Arctic foxes and wolves occur throughout the Arctic Islands, and although hunted and trapped by the Inuit, are generally not major components of local economies. Both species may be attracted to camps by feeding and garbage. Foxes and wolves have specific denning requirements, generally loose, relatively dry sand or gravel that can be easily excavated, making them vulnerable to destruction or prolonged disturbance in such areas.



Birds

The ice and wind scarred landscapes of the Arctic Islands sustain an unusual but varied assortment of birds, including unfamiliar species like the black guillemot or thick-billed murre along with more widely known types such as snow geese and whistling swans.

Compared to southern latitudes, bird life in these northern islands is sparse. About 640 species of birds live in Canada and the United States during at least part of the year. Of these, 65 summer in the high Arctic. Fewer than 6, including the common raven, rock ptarmigan, and the swift gyrfalcon, overwinter in the high Arctic.

Many Arctic Islands species depend on the sea for survival. They nest in colonies of hundreds and sometimes hundreds of thousands, but occupy a very small percentage of the total land and water area. Thick-billed murres, for example, are sleek, penguin-like seabirds that

inhabit both arctic and temperate regions. They nest in colonies on ledges of coastal cliffs near good fish-producing waters, which are not particularly common in the high Arctic. It is not surprising, then, that murre colonies are rare here, and that the same cliffs are used year after year and probably have been for centuries. Much the same situation applies to other seabirds — the northern fulmar, black guillemot, black-legged kittiwake, and ivory, Thayer's, and glaucous gulls — that rely on arctic seas during summer. For each, the habit of nesting in colonies near rich feeding sites has obviously proved to be an effective strategy for survival.

The large and varied flights of ducks typical of the northern prairies do not occur in the high Arctic. But what this region lacks in ducks, it makes up for in geese — particularly in snow geese which nest in immense aggregations: colonies on Baffin Island alone may contain up to

600,000 birds. This species, along with the Atlantic brant (yet another colonial nester), prefers flat coastal habitats near the mouths of large rivers.

Only a few kinds of ducks are abundant in the Arctic Islands, including the tame and colourful eiders and the aggressive oldsquaws which nest on grassy tundra. Well-vegetated tundra and river valley habitats also support a surprising selection of shore birds. Conspicuous among them are the golden plover, ruddy turnstone, northern phalarope, arctic tern, and numerous small sandpipers or "peeps." In addition, there are the acrobatic jaegers, trim, gull-like birds, skilled in the art of aerial piracy.

As one moves inland from the rocky coastlines and away from the lush lowlands and river bottoms, conditions needed to sustain bird populations grow scarce. Moist lowland soils are replaced by rocks and dry sands and gravels; vegetation thins out, ceases to cover large areas. What vegetation does grow here exists in patches that support a few birds, such as rock ptarmigan, hoary redpolls, snow buntings, and horned larks.

The chief avian predators or "raptors" of this region are the snowy owl, the gyrfalcon, and the rare peregrine falcon. Snowy owls feed mostly on lemmings and other small or medium-size mammals, including arctic hares. The two falcons, which prey mostly on birds, are said to be the fastest fliers alive, reaching speeds of 320 kilometres per

hour when diving on prey. Both species construct a meagre nest, usually in high cliffs overlooking hunting ranges, although pairs will occasionally nest on the ground. Like so many other species of the Arctic Islands, peregrines and gyrfalcons may occupy the same nesting areas for generations. Falcons are territorial and occupy home ranges that vary from 20 to 50,000 square kilometres depending on the supply of prey and numbers of acceptable nest sites. They are sensitive to outside disturbance, although this does not hold true for all individuals. Thus the Arctic Islands constitute an important breeding ground for falcons, partly because here they have not been subjected to the pressures of technological development. This is a crucial point with respect to the peregrine which continues to disappear from its traditional ranges because of human interference and pesticide poisoning. For them, the high Arctic may represent a last stand, a place where the species confronts the question of its own extinction.

The larger gyrfalcon appears to be on safer ground, protected in part by its remoteness; yet, because of its low productivity, its winter dependence on limited and fluctuating prey populations, and its stringent nesting requirements, the gyrfalcon is vulnerable to the same catastrophic decline that befell the peregrine.

In a sense, we owe many of our impressions and stereotypes of the high Arctic to the movements and habits of birds. Early explorers of this region were under-

Black-bellied plover



Male rock ptarmigan



standably impressed by the simultaneous arrival of thousands of birds and the subsequent frantic activity associated with breeding, nesting, and rearing of young. That this activity continues 24 hours a day enhances the impression of time too precious to waste. To be accurate, however, "timing" is the more appropriate word, for it is the chronology of climatic events and not the length of summer that governs bird production. This is most forcefully illustrated in years of abnormally cold or late springs. Snow geese have been known to suffer partial or total breeding failures because the land was icebound at the time of egg-laying. When this happens to colonies of half a million birds, continental populations may be depressed for several years. Other species that are psychologically tuned to breed at a specific time will be similarly affected by unseasonable conditions.

The other critical factor is space, critical because the best "space" — the most productive land — is in short supply. Major gathering places of birds may have unique or rare qualities not duplicated within hundreds of kilometres, and this makes them, the land and the birds, vulnerable to disaster. Thus, an accident that poisons a seabird fishery may force thousands of kittiwakes, gulls, murres, and guillemots to abandon their colonies or starve. Persistent human activity near an occupied peregrine aerie may cause the site to be deserted forever, and possibly result in the permanent disappearance of the resident pair from the breeding population.

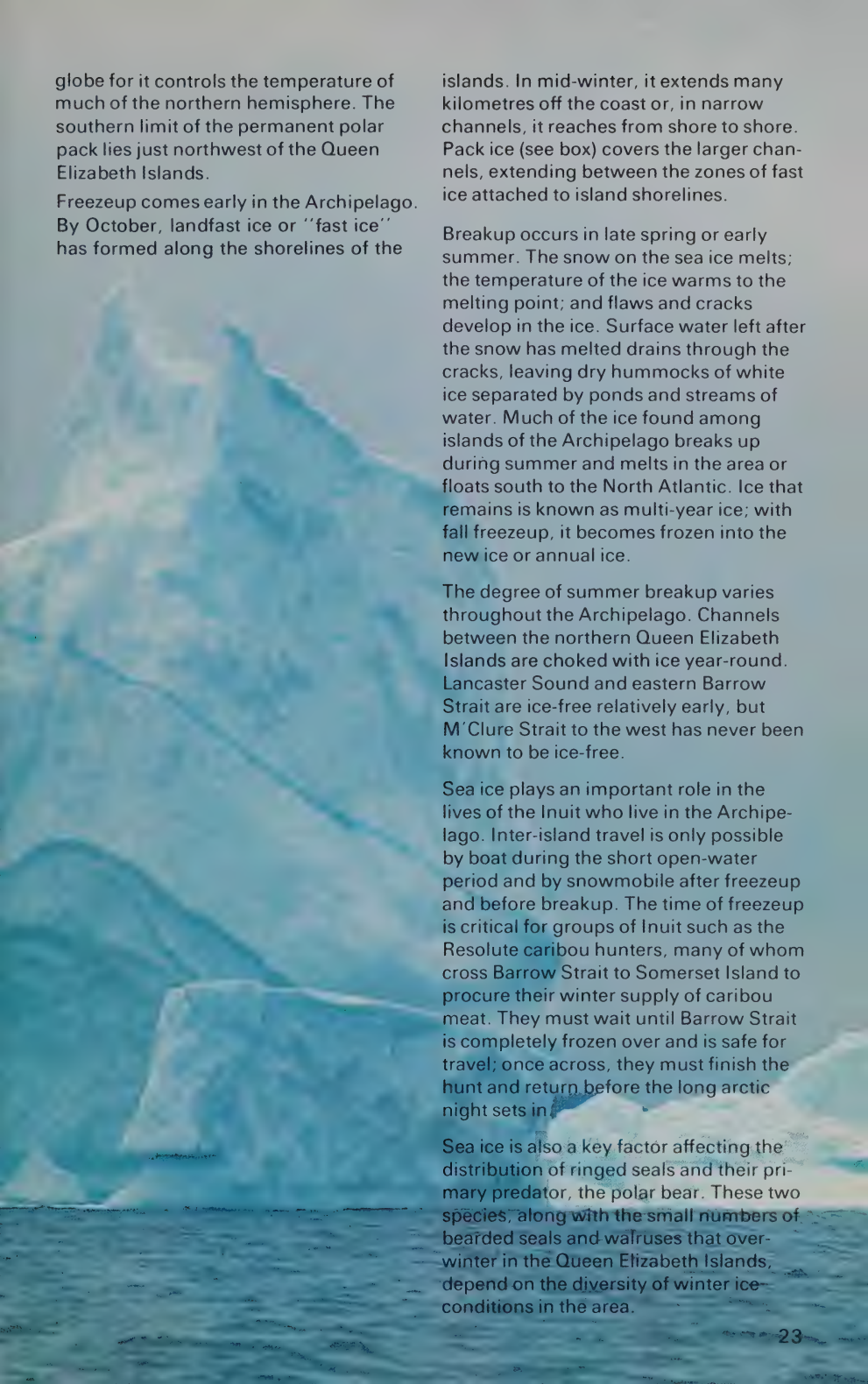
All this is not to suggest that the entire Arctic Islands region is an ecological house-of-cards waiting to collapse at the slightest disturbance. But, it does illustrate where some of the sensitive points are in the Arctic Islands aviary. That we, in our search for energy and resources, are capable of decimating important bird populations goes without saying. The challenge here is not in halting development, but in developing with the care and forethought that will preserve the integrity of populations as they exist today.

Seas and Sea Ice

The Arctic Ocean, a vast expanse normally covered by ice year-round, is extremely deep. Parts of it exceed 4 kilometres, although channels between islands of the Archipelago are seldom over 500 metres deep.

Sea ice dominates the Arctic Ocean. The polar ice pack, which covers the North Pole and extends from the Canadian Arctic Archipelago to the seas off northern Siberia, has been described as the most significant surface area of the





globe for it controls the temperature of much of the northern hemisphere. The southern limit of the permanent polar pack lies just northwest of the Queen Elizabeth Islands.

Freezeup comes early in the Archipelago. By October, landfast ice or "fast ice" has formed along the shorelines of the

islands. In mid-winter, it extends many kilometres off the coast or, in narrow channels, it reaches from shore to shore. Pack ice (see box) covers the larger channels, extending between the zones of fast ice attached to island shorelines.

Breakup occurs in late spring or early summer. The snow on the sea ice melts; the temperature of the ice warms to the melting point; and flaws and cracks develop in the ice. Surface water left after the snow has melted drains through the cracks, leaving dry hummocks of white ice separated by ponds and streams of water. Much of the ice found among islands of the Archipelago breaks up during summer and melts in the area or floats south to the North Atlantic. Ice that remains is known as multi-year ice; with fall freezeup, it becomes frozen into the new ice or annual ice.

The degree of summer breakup varies throughout the Archipelago. Channels between the northern Queen Elizabeth Islands are choked with ice year-round. Lancaster Sound and eastern Barrow Strait are ice-free relatively early, but M'Clure Strait to the west has never been known to be ice-free.

Sea ice plays an important role in the lives of the Inuit who live in the Archipelago. Inter-island travel is only possible by boat during the short open-water period and by snowmobile after freezeup and before breakup. The time of freezeup is critical for groups of Inuit such as the Resolute caribou hunters, many of whom cross Barrow Strait to Somerset Island to procure their winter supply of caribou meat. They must wait until Barrow Strait is completely frozen over and is safe for travel; once across, they must finish the hunt and return before the long arctic night sets in.

Sea ice is also a key factor affecting the distribution of ringed seals and their primary predator, the polar bear. These two species, along with the small numbers of bearded seals and walrus that overwinter in the Queen Elizabeth Islands, depend on the diversity of winter ice conditions in the area.

Ice Features

Pressure Ridges

Pressure ridges develop when ice floes collide, causing the sheet to buckle, forcing up walls of broken ice. They can also develop when tides or currents cause fast ice to heave, crack, and buckle. Ridges are surprisingly solid soon after they form as a melting and refreezing process welds the blocks of ice together.

Pressure ridges as high as 20 metres have been reported off northern Ellesmere Island.

Leads and Polynias

Leads and polynias are areas of open water, anomalies in an ice-filled sea.

Leads, which are long and linear, generally develop between the fast ice and the pack ice as a result of tides, winds, and currents. They usually form late in winter or in spring and are most numerous before breakup. Polynias are generally smaller, non-linear areas that appear in narrow channels where currents are strong. Some polynias remain open throughout the winter, although most form late in spring before breakup.

Leads and polynias tend to recur in the same areas year after year. The famous

"North Water," which recurs year after year in the northern extremities of Baffin Bay, is actually an exceptionally large polynia. In mid-winter it occupies an area of thousands of square kilometres.

Icebergs

Icebergs are large floating masses of ice that have broken off a glacier and drifted out to sea. In the Queen Elizabeth Islands, icebergs are calved off glaciers on Ellesmere, Axel Heiberg, and Devon Islands. Large icebergs can reach the size of a football field. Smaller fragments are "bergybits," about the size of a small cottage, and "growlers," about the size of a rowboat.

Because they originate on land, icebergs are a good source of fresh water. Grise Fiord on Ellesmere Island once depended on icebergs for its fresh-water supply.

The largest individual pieces of fresh-water ice are tabular bergs known as ice islands. These huge, floating plates of ice can be 700 square kilometres or more in area and 10 to 60 metres thick. Because of their relative durability, they have served as bases for scientific research stations.

Ice islands are usually confined to the



Pressure ridges

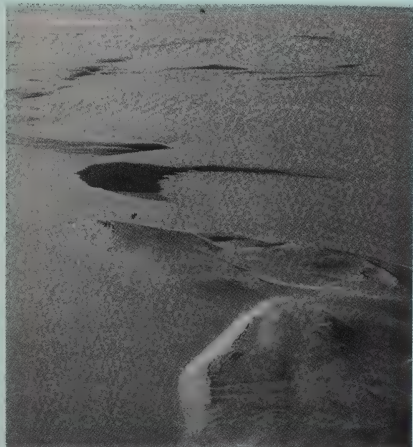
Arctic Ocean and have occasionally been found in channels of the Queen Elizabeth Islands. They are believed to originate from an ice shelf off the northern coast of Ellesmere Island.

Pack Ice

Pack ice is ice that forms on the sea. Such terms as ice fields, ice floes, ice cakes or pan ice, and brash are used to describe pack ice. Ice fields, the largest aggregations of pack ice, are often hundreds of square kilometres in extent. They are made up of thousands of ice chunks that are hummocked and rafted into haphazard shapes and formations. After breakup in summer, smaller aggregations such as pan ice remain.

About 80 percent of pack ice is over one year old. Known as multi-year ice, it is harder and less salty than new ice. Multi-year ice can be used as a supply of fresh water, because as it ages, the salt moves down through the ice and ultimately back into the sea.

Pack ice in the central Arctic grows to a thickness of 1 to 2 metres during the first year. The pack ice that survives the summer continues to grow, although more slowly. It may eventually reach an equilibrium thickness of about 3 metres after 5 to 8 years.



Polynia off Brooman Point, Bathurst Island

Marine Mammals

Ten species of mammals live in, or depend upon the icy waters surrounding the Arctic Islands. Of these, the whales — bowhead, narwhal, and white — live entirely within the ocean. The carnivorous seals, including the walrus and the ringed, bearded, harp, harbour, and hooded seals, are only slightly less reliant on the marine environment. These animals obtain all their food from the sea but occasionally must haul out on land or landfast ice to moult and mate. Finally, there is the polar bear, which spends most of its life wandering the pack ice in search of seals and therefore can be considered a true marine mammal. All these animals carry a thick layer of fat or blubber under their skin to insulate them from frigid water.

Three species are long-standing staples in the Inuit economy: the white whale, ringed seal, and polar bear. The others, while used and valued by the Inuit, are less important because they are not as abundant or as accessible. The bowhead whale, for instance, was formerly hunted by European whalers for its whalebone and was highly prized by the Inuit. But relentless exploitation nearly led to the bowhead's extinction; today, the bowhead population is slowly recovering.

The white whale or "beluga" (meaning whitish in Russian) is technically thought to be more closely related to the dolphins than to true whales. Each spring during May and June, about 10,000 belugas migrate west through Lancaster Sound to summering areas around Somerset Island. Unlike the rarer narwhal, which also inhabits arctic regions, the beluga is a shallow-water whale that prefers coastal inlets and bays to the deeper sounds and straits. Compared to other whales, belugas are slow swimmers and do not stay under water for long periods. Their diet is



Walrus

made up of fish and various invertebrates such as squid.

Belugas breed in spring and give birth to one and sometimes two slate-coloured young the following summer. In late July and in August, cows must bring their newborn calves into estuaries where relatively warm river water enters the sea. Here the young calves are able to survive until they develop enough insulating blubber to withstand extremely cold water. Furthermore, estuaries are rich in the fish and invertebrate life belugas feed on. For these reasons, the major calf-rearing areas such as Creswell Bay and Cunningham Inlet on Somerset Island must be protected.

White whales are no longer harvested commercially. At one time, beluga products were used as ingredients in margarine and as mink food for fur ranches. Today, white whales are still an important resource for the Inuit, providing food for men and dogs, and oil for heat and light.

The ringed seal is the most common and widespread seal in the Arctic Islands, and is a cornerstone of the traditional Inuit

way of life. Primarily solitary, they prefer waters where there is landfast ice or where winds or currents open leads in the pack ice. Such conditions prevail off Baillie-Hamilton Island where seal populations are particularly high.

In winter, ringed seals maintain breathing holes in the fast ice along cracks and pressure ridges. Pups are born on fast ice in lairs dug into snowdrifts or small caves and hollows in pressure ridges. In spring, ringed seals are found along the fast-ice edge where they feed on polar cod and haul out on the ice to moult.

The larger but much less plentiful bearded seal also occurs in the Arctic Islands and is particularly common through Crozier Strait and McDougall Sound. Large numbers of harp seals move through Lancaster Sound in June and July, but harbour and hooded seals occur only as far west as Baffin Island. The walrus, an exceptionally large type of seal, migrates west through Lancaster Sound at least as far as Bathurst Island.

In summer, most seals and walrus are found in coastal habitats. During the open water season, walrus congregate

at "haul-out" sites on floating ice or rocky beaches. Such coastal habitats have a history of long use and therefore are especially important to resident populations.

Although bearded seals and walruses are primarily migrants, small groups of them overwinter in the region, concentrating in areas where strong currents maintain polynyas and areas of thin ice, such as the Penny Strait-Queens Channel-McDougall Sound area.

Polar bears are nomadic and largely solitary residents of the Arctic Islands. In winter, they frequent areas inhabited by seals (principally ringed seals), which make up the bulk of their diet; in summer, they often come ashore, gathering at the heads of bays until the ice re-forms. Pregnant females den during winter, usually in coastal areas, and give birth to tiny, hairless young before spring. When the family leaves the den

in March or April, the cubs will weigh about 9 kilograms and will remain with the female until she is ready to mate again, about two years later.

Recent tagging and tracking studies have shown that polar bears occur in fairly discrete populations, having definite seasonal ranges. Within these ranges are the key areas — the denning, feeding, and summering habitats — where human disturbance can cause the population to fare badly. Because their populations are still low and vulnerable, polar bears are carefully managed and are hunted by the Inuit on the basis of precise quotas assigned to individual settlements.

Bears that are killed by the Inuit or non-resident sportsmen rarely go to waste. The meat is used for food (the liver, being poisonous, is not eaten) and the hide is generally sold. Such benefits are offset somewhat by the dangers that polar bears pose to man (see below).

Avoiding Polar Bears

Polar bears often show little fear of man; indeed, they may wilfully approach people out of hunger, aggressiveness, or curiosity. The result may be a fatal mauling, extensive damage to property, or destruction of the bear.

It is important that newcomers to bear country protect themselves by maintaining clean, preferably enclosed camps and by thoroughly incinerating all garbage and refuse. If possible, camps should not be located on beaches; and scaring devices such as flares and propane cannons should be on hand in camps. Visitors should be aware of the threats posed by bears, and give the animals a wide berth on all occasions.

Don't feed the bears and don't be a brave photographer. If chased, throw off your

parka or pack to distract the bear. In short, when in the Arctic, expect to meet bears as you would expect cold weather and storms — and plan accordingly.



W. GRIFFITH, IGL LTD.



Fish

The Queen Elizabeth Islands do not support a great variety of fish species.

Arctic char are the most important freshwater species, while marine fish such as polar cod, sculpins, and capelin form vital links in the marine food chain.

Arctic char exist in both anadromous (searun) and land-locked forms. Anadromous char weigh about 2 to 3 kilograms although they can grow to 12 kilograms; land-locked char are much smaller.

Char spawn in fall, over gravel beds in lakes and in ponds below rapids in rivers. The eggs incubate all winter and hatch in spring. Anadromous char make their first migration to feeding areas in estuaries after spending 5 to 10 years in fresh water. They migrate seaward in mid-June and return to fresh water from early August to early September.

Char are an important food of the Inuit, although in the Queen Elizabeth Islands some of the best fishing sites are inaccessible and numbers of char harvested are low. Inuit from Resolute take char from the coastal streams and small lakes of Cornwallis Island and occasionally from small lakes along the southeast coast of Bathurst Island. Char are highly valued by the Grise Fiord Inuit who fish on Ellesmere and Devon Islands.

The difficulty of travel over land restricts most char fishing in the Queen Elizabeth Islands to October and November, when the sea ice is safe for travel, and to March, April, and May, when daylight has returned and the ice and snow are still firm. Some summer char fishing occurs in streams or along coasts close to the settlements.

Stone weirs, "fences" of piled rocks, were traditionally used to trap migrating char; the char were intercepted by the Inuit waiting at the fences armed with three-pronged spears. Today, weirs have largely given way to nets, which are set at river mouths and along the coast in summer, and under lake ice in winter. Char are speared or jigged through holes in lake ice in fall and spring; in late spring they are jigged at the edge of the fast ice at river mouths. Char populations would be harmed if their spawning grounds were disturbed or fouled during fall spawning, winter incubation, and spring hatching; if their migration routes to and from the sea were blocked; or if the estuaries where they feed in summer were fouled by oil or other pollutants.

Marine fish, such as Greenland cod, sculpins, and capelin, enjoy a very low status in the Inuit culture and are not favoured as food. Sculpin and cod are jigged through small cracks in the sea ice, mostly by women and children. Capelin, which are washed ashore in summer, have been used as dog food.

Polar cod, a circumpolar marine species, is found throughout the Arctic, often along drifting pan ice or at the fast ice edge. They feed on amphipods and other crustaceans found on the underside of sea ice. Polar cod, in turn, are a favourite food of belugas and narwhals as well as ringed, bearded, and harp seals, and northern fulmars.

Marine fish species would be affected if a massive toxic fuel spill occurred. Such an event would pollute the entire marine food chain, killing marine fish directly as well as indirectly through the destruction of their food source, the animal plankton.

Man and the Cold

A central problem faced by northern newcomers involves learning how to handle the extreme cold. The cold can not only make working in the Arctic extremely uncomfortable, it can also, in various situations, threaten survival.

An initial point to appreciate is that severe cold is not as bad as many people believe. In many respects, the psychological effects of low temperatures are as important as physical ones. Sustained, extreme cold promotes depression in some people and encourages others to give up. Consequently, it is important to have a positive attitude toward dealing with the cold.

Working in the cold is more comfortable if clothing is kept clean and dry. Both wetness and dirt drastically reduce the insulating properties of any clothing. The cold can quickly turn dirty or wet clothes into a set of frozen armour.

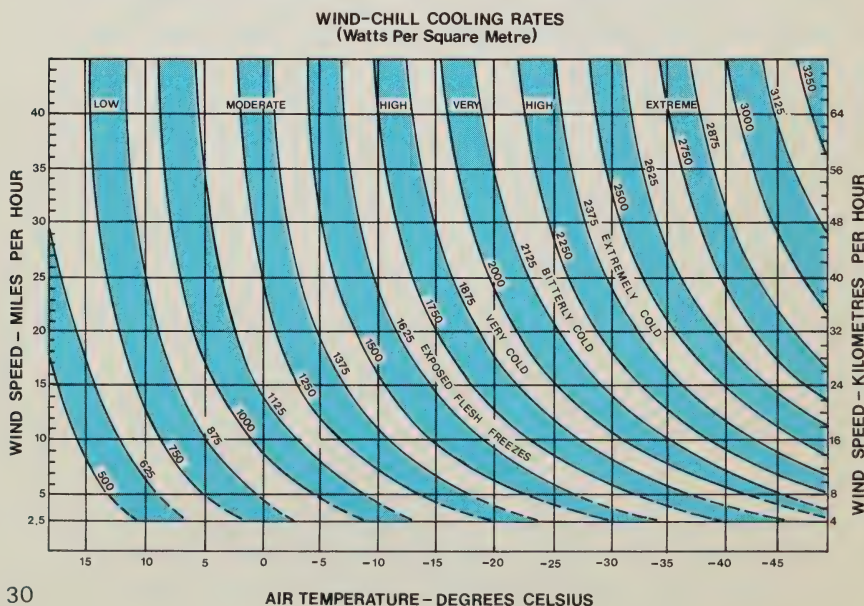
Dry, comfortable work in the Arctic is also assisted by good ventilation of clothes. Hard work causes perspiration which will freeze inside your clothing, decreasing the effective insulation and increasing the chances of freezing. When working in a

parka, drop the hood and allow the warm air around your body to escape.

The insulating quality of clothing depends largely on the existence of dead air spaces between garment surfaces as well as the air spaces within the clothing fabric. The layers of air are an effective insulation against the cold in combination with the insulation value of separate layers. Norwegian fishnet undergarments are based on this principle; their open mesh construction traps air next to the body for maximum warmth.

In the cold, everyone's body works harder to provide the energy necessary to maintain a constant body temperature. Consequently, it is essential to eat properly and regularly. Increasing the intake of high calorie foods, particularly fats, is a common strategy. So is the practice of carrying chocolate bars or candy as sources of quick energy.

In the Arctic, it is important to stay protected from the wind. Temperatures as low as -45°C are not unpleasant if there is no wind, but temperatures of -30°C with a 30-kilometre-per-hour wind are much harder to take because the wind draws heat away from the body. Whenever possible, work should proceed behind wind screens or breaks of some type.



Arctic workers, like seamen, must be constantly aware of the threats and hazards of fire. If a fire gets started, there may be no place to go except into the cold until help arrives — if it arrives.

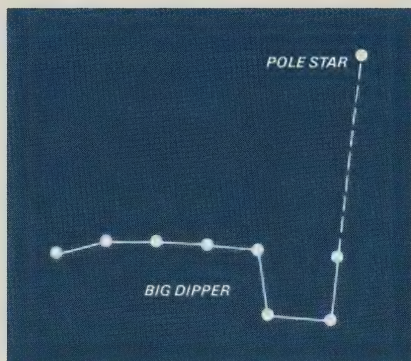
In emergency Arctic situations, the first tasks involve getting warm and protected. Cold hands are efficiently warmed when placed against the belly or genitals, while frostbite is best handled through slow warming. Simple shelters should be built in areas protected from the wind, using snow or available materials. Make a simple snow cave by digging into the side of a snowdrift. Slabs of snow can be used to close off the opening. Attempts to create elaborate structures such as igloos should be avoided because they are often unsuccessful and take lots of vital energy.

When it is necessary to seek shelter at sea, avoid towering icebergs in open water. They are always dangerous as the area below the surface melts faster than that above, causing them to topple over. Low-topped icebergs offer safer shelter. In emergency shelters, build a small fire with a reflector to direct the heat. Even a candle flame in a small enclosure can keep a man from freezing. Prevent carbon monoxide poisoning by providing good ventilation in shelters where a fire is burning.

If you are lost, do not rely on a compass for direction unless you are expert at navigating in high latitudes. The magnetic north pole is *in* the Arctic Islands and its location is constantly changing.

In emergencies, there are several ways of telling direction other than by compass. Snow drifts point in the direction of the prevailing winds which, in most parts of the Arctic, are out of the north, usually north-west or north-east. The sun can also help to determine orientation. The time of day multiplied by 15 gives a rough bearing of the sun. For example, if it is 2:00 p.m., or 1400 hours, the sun will be at 15 times 14, or 210°. At night, the easiest method is to use the pole star, which is almost directly in line with the two stars on the outer edge of the Big Dipper. Simply face the pole star and you are facing true North.

On sea ice, direction may be difficult to determine because the pack ice is constantly moved by winds and currents. Landmarks such as high pressure ridges and hummocks are usable only for short distances, since they may be located on other floes and are constantly changing location. The need for repeated checks on the sun and stars is obvious.



In attempting to attract attention, make signals that are large or highly conspicuous. Fires, flares, or mirror flashes are effective in signaling aircraft. The characters 'X' and 'SOS' also work well when stamped into the snow in letters no less than 2 metres wide and 20 metres tall.

No matter how good the shelter or preparations have been, a person requires water to survive more than a few days. If you cannot find open water, melt ice for water rather than snow; you get more water for the volume with less heat and time. At sea, the experienced Arctic traveller uses last year's ice or older for cooking and drinking. Last year's ice can be distinguished from this year's by the rounded corners which are due to the thaws of summer. It looks bluish in comparison with salty ice which is grey and milky in appearance.

Although emergency situations are rare, when they do occur they can be disastrous. In general, the best strategy involves both preparation and dedication. When travelling it is important to be prepared for the possibility of trouble. And if difficulties occur, it is important to maintain a positive attitude.



R. R. RIEWE

Inuk hunter dressed for -45°C weather in caribou skin parka, sheepskin pants and "mungwa," and sealskin mitts and "kamiks" (Jones Sound).

How the Inuit Dress for Warmth

The Inuk hunter wears woolen or cotton long-johns covered with baggy woolen pants and a couple of woolen jack-shirts or sweaters. Loose-fitting knee-length pants of caribou or sheepskin are worn over the cloth pants. On his feet he wears sealskin "kamiks" or boots over several pairs of woolen socks. For further protection, he can pull on a kind of overshoe ("mungwa") made of two layers of sheepskin. The wool faces inward on the inside but outward on the outer layer for improved traction. With "mungwa" over his "kamiks," a hunter's feet stay warm even at a windchill of 2750 watts per square metre — the equivalent of -40°C with a 40 kilometre-per-hour wind blowing.

Over his shirts or sweaters he wears a thigh-length parka made of a single layer of windproof cotton or a double parka made of an inner duffel parka and a windproof cotton shell. Loose-fitting waist and sleeves permit controlled release of excessive body heat and vapour produced during exertion. The hood of the parka,

which extends forward only to the cheekbones, is closed with a drawstring. It is trimmed with fur, preferably from the shoulders of a wolverine. Frost can be easily shaken from the long, irregular-length, tapered wolverine hair.

On his head, the Inuk wears a tight-fitting crocheted wool cap with a double layered band around the base to protect the ears. A tassel on top prevents the parka hood from falling too far forward over the forehead.

On his hands he wears a double pair of wrist-length mitts, the inner mitt of duffel and the outer of sheared sheepskin for maximum warmth. The mitts may be made of water-proof sealskin if he is handling fish nets or wet harpoon lines.

The hunter slips on an outer skin parka over his cloth parka for further protection if the wind picks up.

Adapted from *A Lesson on Winter Survival* by R. R. Riewe, University of Manitoba, Winnipeg (Manitoba Nature; Winter 1975).

First Aid in the Cold

The chief danger in the Arctic is freezing. Snow blindness and carbon monoxide poisoning are secondary dangers.

Frost-bite

Frost-bite refers to the freezing of the living tissue. Nose, cheeks, ears, and chin are usually the first parts of the body to be affected. Frost-bite may also affect the tips of fingers if gloves are worn instead of mitts, or feet if boots are laced too tightly.

The modern treatment for frost-bite is simply a slow warming up of the frozen areas at room temperature. Once the frost-bite has been cleared up there will be skin damage, which may result in infection. Use a bandage with sulfa powder, boracic acid, or vaseline to prevent further complications once the initial danger is over.

Hypothermia

Hypothermia describes the rapid, progressive mental and physical collapse accompanying the chilling of the vital internal organs of the human body. Caused by exposure to cold, it is aggravated by dampness, wind, and exhaustion. Symptoms include uncontrollable fits of shivering, slurred speech, and frequent stumbling. Without treatment, it may lead to stupor, collapse, and death.

Treatment is accomplished by returning the body temperature to its normal range. The best method is a hot bath and drying with a rough towel. In emergencies, the patient should be taken to a shelter and bedded down. If heating units are unavailable, strip the patient of clothing and place a naked person on each side of the

patient keeping them well covered by blankets.

Efforts to revive a frozen person should continue for several hours as persons apparently dead have been restored to life after many hours of treatment.

Snow Blindness

In the Arctic, especially in late winter and spring, there is danger of severe irritation to the eyes from the sun's rays that are either direct or reflected from snow, ice, or water. Light of unusually high intensity, with the higher-than-normal percentages of ultra-violet characteristic of northern sunlight, strikes the eye from below where it is not protected by eyelids or lashes. The only protection is to wear snow goggles that stop this light from getting through. In a pinch, eye snow shields may be improvised from wood or cloth. Even a dollar bill with small slits for the eyes will do.

Treat snow blindness by protecting the eyes from light and relieving the pain. Protect the eyes by staying in a dark shelter or by wearing a light-proof bandage. Relieve the pain by putting cold compresses on the eyes and by taking aspirin. Most cases recover within 18 hours without medical treatment.

Carbon Monoxide Poisoning

A gas resulting from incomplete combustion of fuels, carbon monoxide is very dangerous and can cause death. The first signs of carbon monoxide poisoning are usually dizziness, headache, nausea, and drowsiness. Treatment is artificial respiration if breathing has stopped and lots of fresh air.

It is hoped that those who read this booklet will be encouraged in an attitude of respect for the environment and people of the Arctic Islands. This is in keeping

with **Petro-Canada's** overall policy of social responsibility and of minimizing environmental disturbance while undertaking activities in the North.

Selected Reading

General

- BURNFORD, Sheila. 1973. *One woman's Arctic*. McClelland and Stewart Limited. Toronto, Ontario.
- GOVERNMENT OF THE NORTHWEST TERRITORIES. *Explorers' guide*. Travel Arctic. Yellowknife, N.W.T. (Issued annually).
- KORING, Paul (editor). 1977. *Canada north almanac*. Research Institute of Northern Canada. Yellowknife, N.W.T.
- STEFANSSON, Vilhjalmur. 1943. *The friendly arctic*. Macmillan Company. London.
- STEFANSSON, Vilhjalmur. 1962. *Unsolved mysteries of the Arctic*. Macmillan Company. London.

Land and Seas

- BROWN, R. J. E. 1970. *Permafrost in Canada — its influence on northern development*. Canadian Building Series No. 4, National Research Council. University of Toronto Press, Toronto, Ontario.
- HERRINGTON, Clyde. 1969. *Atlas of the Canadian Arctic Islands*. Shulton-craft Publishing Ltd. Vancouver, B.C.
- WILKINSON, Douglas. 1970. *The arctic coast*. The Illustrated Natural History of Canada. Natural Science of Canada Limited. Toronto, Ontario.

Plants and Animals

- IRVING, Laurence. 1972. *Arctic life of birds and mammals — including man*. Springer-Verlag. New York, N.Y.

SLATER, John E., A. G. Ronhovde, and L. C. Van Allen. 1971. *Arctic environment and resources*. Arctic Institute of North America. Washington, D.C.

STONEHOUSE, Bernard. 1971. *Animals of the Arctic*. Holt, Rinehart and Winston. New York, N.Y.

History

- HALL, Captain Charles Francis. 1971. *Life with the Esquimau*. Hurtig Reprint, Hurtig Publishers. Edmonton, Alberta.
- KEATING, Bern. 1970. *The Northwest Passage from the Mathew to the Manhattan, 1497 to 1969*. Rand McNally. Chicago, Illinois.
- PRICE, Ray. 1970. *The howling Arctic*. Peter Martin Associates. Toronto, Ontario.

Survival

- COFFEY, M. F. 1956. *Aids to working in the cold*. Defence Research Board, Department of National Defence. Information Canada. Ottawa.
- D.I.A.N.D. 1972. *Northern survival*. Dept. of Indian Affairs and Northern Development, Employment and Related Services Division. Information Canada. Ottawa.
- LE BLANC, Jacques. 1975. *Man in the cold*. Charles C. Thomas. Springfield, Illinois.
- NELSON, Richard K. 1969. *The hunters of the northern ice*. University of Chicago Press. Chicago, Illinois.
- STEFANSSON, Vilhjalmur. *Arctic manual*. Macmillan Company. New York, N.Y.

Industrial Development

- ADVISORY COMMITTEE NORTHERN DEVELOPMENT. 1976. *Guidelines for scientific activities in northern Canada*. Dept. of Indian and Northern Affairs. Ottawa.
- IGLAUER, Edith. 1974. *Denison's ice road*. Clarke, Irwin & Company. Toronto, Ontario.

PIMLOTT, Douglas, D. Brown, and K. Sam. 1976. *Oil under the ice*. Canadian Arctic Resources Committee. Ottawa.

People

BERGER, Thomas R. 1977. *Northern frontier — Northern homeland*. The report of the Mackenzie Valley Pipeline Inquiry: Volume One. Supply and Services Canada. Ottawa

BRIGGS, Jean L. 1970. *Never in anger: Portrait of an Eskimo family*. Harvard University Press. Cambridge, Mass.

BRODY, Hugh. 1975. *The people's land*. Penguin Books. Harmondsworth, England.

BRUEMMER, Fred. 1969. *The long hunt*. The Ryerson Press. Toronto, Ontario.

COWAN, Susan (editor). 1976. *We don't live in snow houses now. Reflections of Arctic Bay*. Canadian Arctic Producers Limited. Ottawa.

CROWE, Keith J. 1974. *A history of the original peoples of northern Canada*. Arctic Institute of North America. McGill-Queen's University Press. Montreal, Quebec and London, Ontario.

DAMAS, David. 1971. *The Eskimo*. Ethnology Division, National Museum of Man. Ottawa.

FREEMAN, Milton M. R. (editor). 1976. *Inuit land use and occupancy project*. Supply and Services Canada. Ottawa.

KEENLEYSIDE, David. 1975. *The land beyond*. Nelson, Foster and Scott Ltd. Toronto, Ontario.

KURELEK, William. 1976. *The last of the Arctic*. McGraw-Hill Ryerson. Toronto, Ontario.

METAYER, Maurice (editor). 1972. *Tales from the igloo*. Hurtig Publishers. Edmonton, Alberta.

O'MALLEY, Martin. 1976. *The past and future land*. Peter Martin Associates. Toronto, Ontario.

Acts and Regulations

These are some of the environmental acts and regulations which may apply to petroleum exploration and development activities in the Arctic Islands.

Arctic Waters Pollution Prevention Act
— Arctic Waters Pollution Prevention Regulations

— Arctic Shipping Pollution Prevention Regulations

Canada Shipping Act

— Air Pollution Regulations

— Garbage Pollution Prevention Regulations

— Oil Pollution Prevention Regulations

— Pollutant Substances Regulations

Clean Air Act

Environmental Contaminants Act

Expanded Guidelines for Northern Pipelines

Fisheries Act

— Northwest Territories Fishery Regulations

— Beluga, Narwhal, Seal Protection Regulations

Migratory Birds Convention Act

— Migratory Bird Regulations

— Migratory Bird Sanctuary Regulations

Northern Inland Waters Act

— Northern Inland Waters Regulations

Northwest Territories Act

— Northwest Territories Archaeological Sites Regulations

Northwest Territories Wildlife Ordinance

Ocean Dumping Control Act

— Ocean Dumping

Control Regulations

Territorial Lands Act

— Canada Oil and Gas Drilling and Production Regulations

— Mining Regulations

— Territorial Land Use Regulations

Background shot to Selected Reading R. R. RIEWE

Back Cover / Inuk Child on Somerset Island

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